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EXAMINER

SANDERS, AARON J

ART UNIT PAPER NUMBER

2169

DATE MAILED: 10/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/710,356	Applicant(s) SHAUGHNESSY, STEVEN T.	
	Examiner Aaron J. Sanders	Art Unit 2169	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Requirement for Information

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

In response to this requirement, please provide a copy of each of the following items of art referred to in the specification.

Date, C., "An Introduction to Database Systems, Eighth Edition", Addison Wesley, 2003

Gray, J. et al., "Transaction Processing: Concepts and Techniques (Morgan Kaufmann Series in Data Management Systems)", Morgan Kaufmann, 1993

Documentation on the "current Oracle solution" cited in [0014]

Documentation on the "JDataStore system" cited in [0025]

Documentation on ISAM cited in [0026]

Documentation on IBM's Information Management System cited in [0026]

Documentation on the Btrieve database cited in [0026]

"JDBC 3.0 API Documentation" from Sun Microsystems cited in [0027]

Documentation on the relevant inventions from E.F. Codd, cited in [0029]

"Information Technology – Database languages – SQL" cited in [0030]

"Information Technology – Database languages – SQL, Parts 1-5" cited in [0030]

"RFC 1180: A TCP/IP Tutorial" cited in [0031]

"JDataStore 7 Developer's Guide" from Borland Software Corp. cited in [0054]

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In responding to those requirements that require copies of documents, where the document is a bound text or a single article over 50 pages, the requirement may be met by providing copies of those pages that provide the particular subject matter indicated in the requirement, or where such subject matter is not indicated, the subject matter found in applicant's disclosure.

The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained may be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action.

A handwritten signature in black ink, appearing to read 'Christian Chace', with a long horizontal line extending to the right.

CHRISTIAN CHACE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. For example, the transaction log, cache view, shadow cache, logical undo module, allocation bitmap, deleting module, etc. must be shown or the features canceled from the claims. See claims 17-30. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The abstract of the disclosure is objected to because it contains more than the permitted 150 words. Appropriate correction is required. See MPEP § 608.01(b).

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: Performing Read-Only Transactions in a Shared Cache.

The use of numerous trademarks, including Btrieve, Java, and Unix, has been noted in this application. They should be capitalized wherever they appear and be accompanied by the generic terminology. Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner that might adversely affect their validity as trademarks.

The disclosure is objected to because it contains embedded hyperlinks, as in at least [0027], [0031], and [0054]. Applicant is required to delete the embedded hyperlinks. See MPEP § 608.01.

The disclosure is objected to because of confusing and inconsistent terminology. For example, in [0099] “shadow cache” and “shadow table” are used interchangeably even though there is a significant difference between a “cache” and a “table”.

Claim Objections

Claims 2 and 18 are objected to because the limitation “to disk” lacks antecedent basis in the specification.

Claims 4 and 20 are objected to because of the following informality: the phrase “without having use a transactional clean point” is grammatically incorrect. Appropriate correction is required.

Claims 4 and 20 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to

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cancel the instant claims, or amend the instant claims to place them in proper dependent form, or rewrite the instant claims in independent form. The instant claims merely state the inherent result of the limitation, “a logical undo operation” in claims 1 and 17 and add nothing to the patentability or substance of the independent claims. It is noted that [0102] of Applicant’s specification states, “For example, physical redo, physical undo, and logical undo are all concepts that exist in log-based transaction management systems” and are therefore admitted prior art.

Claims 8 and 24 are objected to because the limitation “computationally expensive” lacks antecedent basis in the specification. “Expensive” is a relative term of degree and the specification does not appear to define what is “computationally expensive”.

Claims 9, 12, 25, and 28 are objected to because the limitation “reusing the cache view” lacks antecedent basis in the specification. “Reusing” can have more than one interpretation when discussing cache blocks and the specification does not appear to define how it should be interpreted in the claims.

Claims 13 and 29 are objected to because “automatically” does not appear to be defined in the specification and all computers are essentially “automatic”.

Claim Rejections - 35 USC § 112 First Paragraph

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 8, 9, 12, 13, 17, 24, 25, 28, and 29 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject

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matter that was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As per claims 1 and 17, the recited “cache view” is not enabled because there is no indication of how it is implemented in the software/hardware, i.e., as a cache, a table, a database, etc.

As per claims 8 and 24, the disclosure does not appear to disclose how the limitation “computationally expensive” is determined.

As per claims 9, 12, 25 and 28, there does not appear to be any indication in the specification of how the “cache view” is “reused”.

As per claims 13 and 29, “posting back link log records” is not enabled because there does not appear to be a description in the specification of where they are “posted”.

Claim Rejections - 35 USC § 112 Second Paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5-8, 12, 14, 21-24, 28 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 6 and 22 disclose “an allocation bitmap”, however, claim 6 is a method claim and therefore cannot “comprise” a device.

Claims 7 and 23 recite the limitation “the shadow table”. There is insufficient antecedent basis for this limitation in the claims. It is possible that this refers to the “temporary database table” in claims 3 and 19, but that is not apparent as the claims are currently written.

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As per claims 7 and 23, the term “simply” in claims 7 and 23 is a relative term that renders the claim indefinite. The term “simply” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

As per claims 8 and 24, the phrase, “the shadow cache saves off database blocks” is unclear as written. It is not apparent what “saves off” means in the context of the claim.

As per claims 8 and 24, the term “computationally expensive” is a relative term that renders the claim indefinite. The term “computationally expensive” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claims 11 and 27 recite the limitation “reusing blocks”. There is insufficient antecedent basis for this limitation in the claims. It is possible that “blocks” refers to the “database blocks” also in claims 11 and 27, but this is not apparent as written.

Regarding claims 5, 12, 14, 21, 28 and 30, the word “if” renders the claim indefinite because it is unclear whether the limitations following the word are part of the claimed invention. Only the definite limitations disclosed in the claims will be examined. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-30 are rejected under 35 U.S.C. 101 because they appear, in light of the application viewed as a whole, to be software *per se*. No hardware or processor is claimed which performs and/or embodies the claimed subject matter. There does not appear to be any

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tangible result of the data manipulation in the claims. Accordingly, the claims do not appear to contain a useful result. For example, claim 15 recites a “computer-readable medium having processor-executable instructions”. However, just because the instructions are executable does not mean they have been executed. Further, claim 16 recites a “downloadable set of processor-executable instructions”. Again, the instructions have not been downloaded, and could be downloaded on a non-statutory carrier wave. Also, the “modules” in claims 17-30 are not specifically defined as hardware in the specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, 9, 10, 12, 13, 15-23, 25, 26, 28, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Hayashi et al., U.S. Pat. 5,715,447.

The claims below have been interpreted to the best of the Examiner’s ability due to the 35 USC 112 rejections.

As per claims 1-7, 9, 10, 12, 13, 15-23, 25, 26, 28, and 29, Hayashi et al. teach:

1. In a database system employing a transaction log, an improved method for restoring databases to a consistent version, the method comprising:

providing a shared cache storing database blocks for use by multiple databases (See e.g. Fig. 4, “shared buffers 17”);

for a read-only transaction of a given database, creating a cache view of the shared cache using the given database's transaction log, said cache view comprising particular database blocks of the shared cache that record a view of a particular version of the database at a given point in time (See e.g. Fig. 4, "log buffer 16" where, see Brief Summary par. 14, "a log buffer for temporarily storing pre-update and post-update logs");

creating a shadow cache for storing any database blocks that overflow said cache view (See e.g. Fig. 2 where, see Detailed Description par. 11, "A buffer shared by the transactions is a bit map 30. The database 20 includes overflow pages 31. A database 20' is used to nonvolatilize the contents of the shared buffer. The bit map 30 controls overflow pages 31"); and

in conjunction with the cache view and the shadow cache, preserving a logical undo operation for the read-only transaction of the given database, so as to allow the given database to be restored to a transactionally consistent version upon starting the read-only transaction (See e.g. Detailed Description par. 19, "When the contents of the updated page are completely written back to the allotted page on the disk, an original page is shifted to the allotted page in the table, and then a commitment is given to the transaction. A rollback is achieved by simply discarding the allotted page". It is noted that [0102] of Applicant's specification states, "For example, physical redo, physical undo, and logical undo are all concepts that exist in log-based transaction management systems" and are therefore admitted prior art).

2. The method of claim 1, wherein during occurrence of the read-only transaction any database blocks associated with the cache view are not written from the shared cache back to disk (See e.g. Detailed Description par. 10, "The contents (i.e., pages) of the shared buffer are written back to the disk (i.e., data base 20) at a predetermined timing. Then, a log holding data

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updated by the last read or write operation will not be needed for recovering the contents of the buffer even if they are lost. The log buffer 16 temporarily stores pre-update and post-update logs of the shared buffers B1 and B2. The contents of the log buffer 16 are nonvolatilized by saving them in the log file 19 at a predetermined timing”).

3. The method of claim 1, wherein the shadow cache is implemented via a temporary database table (See e.g. Fig. 2, “database 20” and “overflow pages 31”).

4. The method of claim 1, wherein said logical undo operation allows the system to bring the cache view into a transactionally consistent state without having use a transactional clean point (See e.g. Detailed Description par. 19, “When the contents of the updated page are completely written back to the allotted page on the disk, an original page is shifted to the allotted page in the table, and then a commitment is given to the transaction. A rollback is achieved by simply discarding the allotted page”. It is noted that [0102] of Applicant’s specification states, “For example, physical redo, physical undo, and logical undo are all concepts that exist in log-based transaction management systems” and are therefore admitted prior art).

5. The method of claim 1, wherein the shadow cache is used only if an overflow occurs (See e.g. Fig. 2 where, see Detailed Description par. 11, “A buffer shared by the transactions is a bit map 30. The database 20 includes overflow pages 31. A database 20’ is used to nonvolatilize the contents of the shared buffer. The bit map 30 controls overflow pages 31”).

6. The method of claim 1, further comprising:
an allocation bitmap indicating database blocks in use (See e.g. Fig. 2, “bit map 30” and “overflow pages 31”).

7. The method of claim 6, further comprising:

deleting the shadow cache simply by updating the allocation bitmap for allocated database blocks and then deleting the shadow table (See e.g. Detailed Description par. 11, “any bit of the bit map 30 will be ON when a corresponding one of the overflow pages 31 is in use and OFF when the corresponding page is unused” where making all bits OFF would effectively remove them from the “shared buffer”).

9. The method of claim 1, further comprising:

reusing the cache view in instances where database blocks of the cache view remained unchanged since starting the read-only transaction (See e.g. Detailed Description par. 15, “it is necessary to employ a special logging system employing a restricted structure and independent characteristics. Such logging systems may substitute old logs for lost logs”).

10. The method of claim 1, further comprising:

upon termination of the read-only transaction, marking the cache view as closed (See e.g. Detailed Description par. 10, “The log buffer 16 temporarily stores pre-update and post-update logs of the shared buffers B1 and B2. The contents of the log buffer 16 are nonvolatilized by saving them in the log file 19 at a predetermined timing”).

12. The method of claim 1, further comprising:

reusing the cache view for other read-only transactions, if no new write operations have been committed (See e.g. Detailed Description par. 3, “A log buffer 16 stores pre-update and post-update logs” where no new log is created unless there is a write, thus the last update log is used for the next transaction).

13. The method of claim 1, further comprising:

automatically detecting the read-only transaction (See e.g. Brief Summary par. 4, “Application programs running on a computer create transactions to query the database management system”); and

upon occurrence of write operations, posting back link log records that serve to link together blocks of the transaction log that pertain to the read-only transaction (See e.g. Detailed Description par. 10, “The contents (i.e., pages) of the shared buffer are written back to the disk (i.e., data base 20) at a predetermined timing. Then, a log holding data updated by the last read or write operation will not be needed for recovering the contents of the buffer even if they are lost” and Fig. 2, “log buffer 16” where the update logs are linked together).

15. A computer-readable medium having processor-executable instructions for performing the method of claim 1 (See e.g. Brief Summary par. 9, “The present invention relates to a method of and an apparatus for” where an “apparatus” implies “A computer-readable medium having processor-executable instructions”).

16. A downloadable set of processor-executable instructions for performing the method of claim 1 (See e.g. Brief Summary par. 9, “The present invention relates to a method of and an apparatus for” where an “apparatus” implies “A downloadable set of processor-executable instructions”).

17. A database system capable of restoring databases to a consistent version, the system comprising:

a database system employing a transaction log (See e.g. Brief Summary par. 14, “a log buffer for temporarily storing pre-update and post-update logs, a log file for storing the pre-update and post-update logs”);

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a shared cache that stores database blocks for use by multiple databases (See e.g. Fig. 4, “shared buffers 17”);

a cache view of the shared cache created using the transaction log of a given database, said cache view being created in response to a read-only transaction of a given database, said cache view comprising particular database blocks of the shared cache that record a view of a particular version of the database at a given point in time (See e.g. Fig. 4, “log buffer 16” where, see Brief Summary par. 14, “a log buffer for temporarily storing pre-update and post-update logs”);

a shadow cache for storing any database blocks that overflow said cache view (See e.g. Fig. 2 where, see Detailed Description par. 11, “A buffer shared by the transactions is a bit map 30. The database 20 includes overflow pages 31. A database 20’ is used to nonvolatilize the contents of the shared buffer. The bit map 30 controls overflow pages 31”); and

a module for preserving a logical undo operation for the read-only transaction of the given database, so as to allow the given database to be restored to a transactionally consistent version upon starting the read-only transaction (See e.g. Detailed Description par. 19, “When the contents of the updated page are completely written back to the allotted page on the disk, an original page is shifted to the allotted page in the table, and then a commitment is given to the transaction. A rollback is achieved by simply discarding the allotted page”. It is noted that [0102] of Applicant’s specification states, “For example, physical redo, physical undo, and logical undo are all concepts that exist in log-based transaction management systems” and are therefore admitted prior art).

18. The system of claim 17, wherein during occurrence of the read-only transaction any database blocks associated with the cache view are not written from the shared cache back to disk (See e.g. Detailed Description par. 10, "The contents (i.e., pages) of the shared buffer are written back to the disk (i.e., data base 20) at a predetermined timing. Then, a log holding data updated by the last read or write operation will not be needed for recovering the contents of the buffer even if they are lost. The log buffer 16 temporarily stores pre-update and post-update logs of the shared buffers B1 and B2. The contents of the log buffer 16 are nonvolatilized by saving them in the log file 19 at a predetermined timing").

19. The system of claim 17, wherein the shadow cache is implemented via a temporary database table (See e.g. Fig. 2, "database 20" and "overflow pages 31").

20. The system of claim 17, wherein said logical undo operation allows the system to bring the cache view into a transactionally consistent state without having use a transactional clean point (See e.g. Detailed Description par. 19, "When the contents of the updated page are completely written back to the allotted page on the disk, an original page is shifted to the allotted page in the table, and then a commitment is given to the transaction. A rollback is achieved by simply discarding the allotted page". It is noted that [0102] of Applicant's specification states, "For example, physical redo, physical undo, and logical undo are all concepts that exist in log-based transaction management systems" and are therefore admitted prior art).

21. The system of claim 17, wherein the shadow cache is used only if an overflow occurs (See e.g. Fig. 2 where, see Detailed Description par. 11, "A buffer shared by the transactions is a bit map 30. The database 20 includes overflow pages 31. A database 20' is used to nonvolatilize the contents of the shared buffer. The bit map 30 controls overflow pages 31").

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22. The system of claim 17, further comprising:

an allocation bitmap indicating database blocks in use (See e.g. Fig. 2, “bit map 30” and “overflow pages 31”).

23. The system of claim 22, further comprising:

a module for deleting the shadow cache simply by updating the allocation bitmap for allocated database blocks and then deleting the shadow table (See e.g. Detailed Description par. 11, “any bit of the bit map 30 will be ON when a corresponding one of the overflow pages 31 is in use and OFF when the corresponding page is unused” where making all bits OFF would effectively remove them from the “shared buffer”).

25. The system of claim 17, further comprising:

a module for reusing the cache view in instances where database blocks of the cache view remained unchanged since starting the read-only transaction (See e.g. Detailed Description par. 15, “it is necessary to employ a special logging system employing a restricted structure and independent characteristics. Such logging systems may substitute old logs for lost logs”).

26. The system of claim 17, further comprising:

a module for marking the cache view as closed, upon termination of the read-only transaction (See e.g. Detailed Description par. 10, “The log buffer 16 temporarily stores pre-update and post-update logs of the shared buffers B1 and B2. The contents of the log buffer 16 are nonvolatilized by saving them in the log file 19 at a predetermined timing”).

28. The system of claim 17, further comprising:

a module for reusing the cache view for other read-only transactions, if no write operations have occurred (See e.g. Detailed Description par. 3, “A log buffer 16 stores pre-

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update and post-update logs” where no new log is created unless there is a write, thus the last update log is used for the next transaction).

29. The system of claim 17, further comprising:

a module for automatically detecting the read-only transaction, and posting back link log records that serve to link together blocks of the transaction log that pertain to the read-only transaction (See e.g. Brief Summary par. 4, “Application programs running on a computer create transactions to query the database management system” and Detailed Description par. 10, “The contents (i.e., pages) of the shared buffer are written back to the disk (i.e., data base 20) at a predetermined timing. Then, a log holding data updated by the last read or write operation will not be needed for recovering the contents of the buffer even if they are lost” and Fig. 2, “log buffer 16” where the update logs are linked together).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8, 14, 24, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi et al. as applied to claims 1-7, 9, 10, 12, 13, 15-23, 25, 26, 28, and 29 above, in view of Raz, U.S. Pat. 5,701,480.

As per claims 8 and 24, Hayashi et al. disclose the subject matter of the claims upon which the instant claims depend, but do not appear to disclose saving “database blocks that are computationally expensive to recreate”. However, Raz does make such a disclosure and

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provides the motivation for making the combination, see e.g. Raz Brief Summary par. 20, “In general, there is a considerable storage cost for maintaining the required number of prior versions, and for reading older versions rather than younger versions of the data objects.

Attempts to reduce these costs have focused on improving the efficiency of caching or buffering the prior versions, and on scheduling the read-only transactions in order reduce the number of prior versions that are kept in storage. In general, scheduling selectively delays the initiation of read-only transactions, and therefore involves a trade-off of query [sic] response time for reduced storage cost and system overhead”. Hayashi et al. and Raz are analogous art because they both discuss cache operations. At the time of the invention, it would have been obvious to one of ordinary skill in the art having the teachings of Hayashi et al. and Raz before him or her to save computationally expensive blocks in a cache.

As per claims 14 and 30, Hayashi et al. disclose the subject matter of the claims upon which the instant claims depend, but do not appear to disclose “using the back link log records to skip portions of the transaction log that are irrelevant for undoing the read-only transaction”. However, Raz does make such a disclosure and provides the motivation for making the combination, see e.g. Raz Detailed Description par. 114, “the computer 20 processes transactions using an “undo” recovery mechanism that provides very fast recovery because only the effects of failed transactions must be undone. A considerable amount of processing time, however, is spent flushing updated records to non-volatile state memory and updating the non-volatile snapshot memory when each transaction is committed... For transactions that update the same records for multiple transactions, and transactions that are short and do not update many pages, a considerable fraction of the processing time is wasted by flushing the updated records to state

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memory at the end of every transaction”. Hayashi et al. and Raz are analogous art because they both discuss cache operations. At the time of the invention, it would have been obvious to one of ordinary skill in the art having the teachings of Hayashi et al. and Raz before him or her to skip irrelevant portions of the transaction log.

Claims 11 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi et al. as applied to claims 1-7, 9, 10, 12, 13, 15-23, 25, 26, 28, and 29 above, and further in view of *The Authoritative Dictionary of IEEE Standards Terms, Seventh Edition*, IEEE Press, 2000.

As per claims 11 and 27, Hayashi et al. disclose the subject matter of the claims upon which the instant claims depend, but do not disclose a garbage collection for individual data blocks. However, *IEEE* does make such a disclosure and provides the motivation for making the combination, see e.g. “garbage collection (B) A database reorganization technique in which the contents of a database are made more compact by physically deleting garbage such as records that have been deleted logically but remain physically in the database” and “cache (2) A small portion of high-speed memory used for temporary storage of frequently-used data, instructions, or operands”. Hayashi et al. and *IEEE* are analogous art because they both discuss database operations. At the time of the invention, it would have been obvious to one of ordinary skill in the art having the teachings of Hayashi et al. and *IEEE* before him or her to perform garbage collection on data blocks in the cache.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron J. Sanders whose telephone number is 571-270-1016. The examiner can normally be reached on M-Th 7:30a-5:00p.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christian Chace can be reached on 571-272-4190. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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